IN THE CLAIMS

The following are Claims 1-33.

1. (Original) A pulse position modulation discriminator comprising:

a fiber assembly adapted to provide self-phase modulation and dispersion to a first optical signal;

an optical switch adapted to receive the first optical signal from the fiber assembly and a second optical signal and provide a third optical signal, wherein the third optical signal has a wavelength based on a delay associated with the first optical signal relative to the second optical signal;

a demultiplexer adapted to receive the third optical signal and provide the third optical signal to one of a plurality of channels based on the wavelength;

a plurality of photodetectors corresponding to the plurality of channels and adapted to convert the third optical signal into an electrical signal; and

a discriminating circuit coupled to the photodetectors and adapted to receive the electrical signal and determine which of the plurality of channels provided the electrical signal, wherein the discriminating circuit provides a digital output signal.

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2. (Original) The pulse position modulation discriminator of Claim 1, further comprising optical amplifiers adapted to amplify the first optical signal and the second optical signal and provide the first optical signal and the second optical signal to the fiber assembly and the optical switch, respectively.

3. (Original) The pulse position modulation discriminator of Claim 2, further comprising a plurality of filters corresponding to the plurality of channels and coupled between the demultiplexer and the plurality of photodetectors, wherein the plurality of filters are adapted to filter the third optical signal.

4. (Original) The pulse position modulation discriminator of Claim 1, wherein a bandwidth of the first optical signal is greater than a bandwidth of the second optical signal times the number of channels.

5. (Original) The pulse position modulation discriminator of Claim 1, wherein the optical switch comprises an ultrafast non-linear interferometer, a semiconductor laser amplifier in a loop mirror, or a Mach-Zehnder interferometer.

6. (Original) The pulse position modulation discriminator of Claim 1, wherein the demultiplexer comprises

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an arrayed-waveguide grating demultiplexer or a wavelength-independent star coupler.

7. (Original) The pulse position modulation discriminator of Claim 1, wherein the digital output signal indicates a temporal position of pulse position modulated optical pulses provided by the first optical signal or the second optical signal.

8. (Original) The pulse position modulation discriminator of Claim 1, wherein the discriminating circuit provides frequency shift keying detection.

9. (Original) The pulse position modulation discriminator of Claim 1, wherein the pulse position modulation discriminator forms part of a communications receiver.

10. (Original) A method of decoding pulse position modulated optical signals, the method comprising:

receiving a first optical signal and a second optical signal, wherein the first optical signal comprises pulse position modulated optical signals;

broadening a spectrum and chirping the first optical signal or the second optical signal;

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providing a third optical signal having a wavelength based on a delay of the first optical signal relative to the second optical signal; and

providing an electrical output signal based on the wavelength of the third optical signal.

11. (Original) The method of Claim 10, wherein the electrical output signal is a digital signal indicating a temporal position of the pulse position modulated optical signals of the first optical signal.

12. (Original) The method of Claim 10, further comprising amplifying the first optical signal and the second optical signal.

13. (Original) The method of Claim 12, further comprising filtering the third optical signal.

14. (Original) The method of Claim 13, wherein the providing of the electrical output signal further comprises converting the third optical signal to an electrical signal.

15. (Original) The method of Claim 10, further comprises routing the third optical signal to one of a plurality of paths based on the wavelength, wherein the electrical output signal indicates which of the paths provided the third optical signal.

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16. (Original) An apparatus comprising:

a fiber assembly adapted to spectrally broaden and chirp a first optical signal; and

an optical switch coupled to the fiber assembly and adapted to receive the first optical signal and a second optical signal and provide a third optical signal with a wavelength dependent upon a relative delay between the first optical signal and the second optical signal.

17. (Original) The apparatus of Claim 16, wherein the first optical signal or the second optical signal provides a pulse position modulated optical signal, the apparatus converting the pulse position modulated optical signal to a frequency modulated optical signal.

18. (Original) The apparatus of Claim 17, wherein the apparatus forms part of a communications system adapted to transmit the frequency modulated optical signal.

19. (Original) The apparatus of Claim 17, further comprising:

optical amplifiers adapted to amplify the first and second optical signals;

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a demultiplexer adapted to receive the third optical signal and route the third optical signal to one of a plurality of paths based on its wavelength;

a plurality of filters corresponding to the plurality of paths and adapted to filter the third optical signal;

a plurality of photodetectors corresponding to the plurality of filters and adapted to convert optical signals to electrical signals; and

a decision-making circuit adapted to receive the electrical signals from the plurality of photodetectors and provide a digital output signal whose value corresponds to a temporal position of the pulse position modulated optical signal.

20. (Original) The apparatus of Claim 19, wherein the decision-making circuit is adapted to determine which of the plurality of paths provided the third optical signal and indicate this determination by a value of the output signal.

21. (Original) The apparatus of Claim 17, wherein the fiber assembly comprises a self-phase modulation section and a dispersion section.

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22. (Original) A method of converting pulse position modulated optical signals to frequency modulated optical signals, the method comprising:

providing self-phase modulation and dispersion to a first optical signal;

selecting a portion of the first optical signal at a first wavelength based on a time difference between the first optical signal and a second optical signal, wherein the first optical signal or the second optical signal comprises pulse position modulated optical signals; and

providing an optical output signal having the first wavelength.

23. (Original) The method of Claim 22, further comprising transmitting the optical output signal, wherein the optical output signal is a frequency modulated optical signal based on the pulse position modulated optical signals.

24. (Original) The method of Claim 22, further comprising:

amplifying the first optical signal and the second optical signal;

routing the optical output signal to one of a plurality of optical paths based on the first wavelength;

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converting the optical output signal to an electrical output signal; and

determining which of the optical paths provided the optical output signal based on the electrical output signal and providing a digital output signal whose value is based on the time difference between the first optical signal and the second optical signal.

25. (Original) A pulse position modulation discriminator comprising:

dispersive elements adapted to impart a chirp onto a first optical signal and a second optical signal, wherein the first optical signal comprises pulse position modulated pulses; and

an optical nonlinearity device adapted to receive the first optical signal and the second optical signal and provide a third optical signal whose wavelength is based on a time delay between the first optical signal and the second optical signal.

26. (Original) The pulse position modulation discriminator of Claim 25, wherein the pulse position modulation discriminator forms part of a transmitter, with the third optical signal transmitted as frequency modulated pulses.

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27. (Original) The pulse position modulation discriminator of Claim 25, further comprising:

a demultiplexer adapted to receive the third optical signal and provide the third optical signal to one of a plurality of channels based on the wavelength;

a plurality of photodetectors corresponding to the plurality of channels and adapted to convert the third optical signal into an electrical signal; and

a discriminating circuit coupled to the photodetectors and adapted to receive the electrical signal and determine which of the plurality of channels provided the electrical signal, wherein the discriminating circuit provides a digital output signal.

28. (Original) The pulse position modulation discriminator of Claim 27, further comprising a plurality of filters corresponding to the plurality of channels and adapted to filter optical signals in the channels.

29. (Original) The pulse position modulation discriminator of Claim 25, wherein the frequencies of the first optical signal and the second optical signal are slewed at the same rate but in opposite directions, at the same rate and direction, or at a different rate but in the same direction.

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30. (Original) A method of discriminating pulse position modulated optical signals, the method comprising:

receiving a first optical signal comprising pulse position modulated optical signals;

receiving a second optical signal;

providing a third optical signal having a wavelength based on a relative time difference between a pulse of the first optical signal and a pulse of the second optical signal; and

providing an electrical output signal whose value is based on the wavelength of the third optical signal.

31. (Original) The method of Claim 30, wherein the providing the third optical signal further comprises:

providing self-phase modulation and dispersion to the first optical signal or the second optical signal; and

selecting a portion of the first optical signal or the second optical signal, depending upon which received the self-phase modulation and the dispersion, based on the relative time difference, with the portion providing the wavelength for the third optical signal.

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32. (Original) The method of Claim 31, further comprising:

routing the third optical signal to one of a plurality of paths based on the wavelength;

converting the third optical signal to an electrical signal; and

determining which path contained the third optical signal based on the electrical signal, wherein the electrical output signal is a digital signal.

33. (Original) The method of Claim 30, wherein the providing the third optical signal further comprises:

providing dispersion to the first optical signal and the second optical signal; and

selecting a portion of the first optical signal or the second optical signal based on the relative time difference, with the portion providing the wavelength for the third optical signal.

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